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16,000 DEATHS

It is claimed that smoking causes 16,000 deaths in Australia each year. This claim is based on a paper produced by Dr Les Drew of the Commonwealth Department of Health (1) in which it is claimed that there were 16,169 tobacco-related - and the emphasis is on related - deaths in Australia in 1980.

Fundamental to such a calculation is the attribution rate, that is the percentage of deaths from a particular disease which are attributable to smoking. For instance Drew calculated that 80% of male deaths from lung cancer are related to smoking. So to get the number of male lung cancer deaths related to smoking, one calculates 80% of the total number of male lung cancer deaths.

To calculate attribution rates we need the relative mortality rates for each disease. Relative mortality rates - that is the ratio of the mortality rate of smokers divided by that of non-smokers - are obtained from epidemiological studies. These studies necessarily rely on samples as there are no figures relating individual smoking histories to specific deaths collected for whole populations.

It is this reliance on sampling that introduces a contentious aspect in the calculations. The study used by Dr Drew to derive his attribution rates is the million persons study carried out by the American Cancer Society and reported by Hammond (2). Before we look at this particular study it is well to make a few points about sampling and the traps that lay in wait for the unwary.

1. The only purpose for collecting information about a sample is to be able to make an inference about a population.

2. To this end the sample must be representative of the population in the area of interest to the study and in all aspects which might affect this area.

3. There are simple ways of testing this sample adequateness.

4. Apart from problems which arise due to the method of sample selection, there are difficulties in any study relating to determining all the factors which will have an influence on what we are studying.

5. Even if we can list all possible influences there could still be a problem in measuring them.

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Let us look at some of these simple methods of testing whether or not a particular sample can be seen to be representative of the population. In selecting the sample to examine the effect of smoking on health we could list those diseases in which we are most likely to be interested. They are cancer of the respiratory system, ischaemic heart disease, cerebro-vascular disease and chronic obstructive lung disease. There could be others but these are the major diseases said to be related to smoking. It is known that mortality for these diseases is affected by:

1. The age distribution of the population. The older one is the higher the mortality rate from these diseases.

2. Sex distribution of the population. Males at any age have higher mortality rates with the exception of cerebro-vascular disease, for females, particularly elderly females, have a higher rate for this disease.

3. Urban/rural distribution. Rural dwellers have lower lung cancer mortality rates than do city dwellers.

4. Ethnic make-up. Some races have higher mortality rates than others. This is important in a study of the population of the United States of America which is more racially heterogeneous than Australia.

5. Socio-economic status. For most of these diseases those of lower socio-economic status have higher mortality rates.

To determine the effect of smoking on health any sample chosen must have the same spread across these variables as the population from which it is drawn. Dr T. Sterling (3) has shown that the American Cancer Society (ACS) study sample differs markedly from the USA population from which it was chosen with respect to age distribution, educational attainment, racial structure and place of residence.

Another test applicable to this sort of study is the comparison of the overall mortality rate for each disease for the sample with that of the population. The ACS study has the same general mortality rate as the American population but for the diseases under consideration and breast cancer the study had far higher death rates. A comparison of these facts led Sterling to conclude that there were two main criteria for a person being asked to take part in the ACS study.

1. One had to be a smoker

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2. One had to be in ill health

What we have here is a biased sample any results from which cannot be applied to the population from which it was drawn.

The attribution rates which are the basis of Dr Drew's tobacco related deaths calculation, derived as they are from the ACS study, have no objective reality. It is not good enough to state as Dr Drew did that there have been no studies done which satisfy the criteria of good sample design and go on to use such flawed studies, with their inherent errors of measurement, as has been done.

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